the PCSs are enabled, and the sync for the system **8**, and particularly the fuel cell PCSs, is provided by the utility grid bus

Specifically, M2 rapidly transitions to "On", while M1 remains "Off" for the brief interval required for switch **19** to transition from "On" to "Off". The discrete signals D1 and D2 have the same states as M1 and M2, respectively. The transition of signal M2 (and thus D2) to the "On" state serves to briefly turn "Off" the inverter gates in the PCSs such that, for a brief interval less than 4 ms, the PCSs of the fuel cells **18** do not provide an electrical power output while they are being reconfigured to the G/I mode of operation. During this interval, the PCS output regulators are being reconfigured, such that in the G/C mode they regulate power (real) and VARs and in the G/I mode they regulate voltage and frequency. The sync is also being reconfigured during this interval. This interruption is sufficiently brief and the switch **19** sufficiently fast, that there is little or no chance for an overload on grid **10** to adversely impact the remainder of power system **8**.

After this brief interval of 4 ms, or less, the system **8** is reconfigured and operating in the G/I mode. The mode signals M1 and M2 (and thus also, D1 and D2) are both "On", the switch **19** is "Off" (open) such that the system is disconnected from the utility grid bus **8**, and the inverter gates in the PCSs are again on to provide power to the load(s) **14** from the fuel cells **18**. At this time, the output from the PCSs is being "clocked", or synchronized, by the crystal **61**. In the G/I mode, the fuel cell power plants **18** supply, or continue to supply, power to the loads **14** at regulated voltage and frequency without involvement of the utility grid, at least to the maximum capacity of the collective fuel cells.

At such time as the utility grid bus **10** comes back within acceptable limits as determined by sensor **45**, the control logic **49** of the static switch module **17** reverses the prior mode change sequence and begins the transition from the G/I mode back to the G/C mode. Mode signal M2 first goes "Off" while M1 briefly remains "On", the switch **19** quickly transitions from "Off" to "On" such that the utility grid bus **10** is once again connected to the loads **14** together with the fuel cells **18**, the PCS inverter gates are again briefly "Off" during reconfiguring, and the PCS synchronization is changing from reliance on crystal **61** to that of the utility grid supply. The internal PCS output regulation changes from voltage and frequency to power and VARs. Following the brief interval (less than 4 ms) for reconfiguring, the system **8** has been returned to the G/C state, or mode.

Although the invention has been described and illustrated with respect to the exemplary embodiments thereof, it should be understood by those skilled in the art that the foregoing and various other changes, omissions and additions may be made without departing from the spirit and scope of the invention. For example, the static switch module **17**, and particularly switch **19** therein, is/are depicted as being separate from and external to, the fuel cells **18** and their respective PCS's, thus providing the economy of singular control elements responsible for controlling multiple fuel cells. However, it will be appreciated that these controls could be integral with or internal to the respective fuel cells, particularly if there is but a single fuel cell power plant. Moreover, although the static switch **19** is described in the context of pairs of SCRs, it will be appreciated that other static switching devices capable of similar switching speeds and current ratings may also be used. It will also be understood that a greater or lesser number of fuel cell power plants may be employed, and both the voltage and the current ratings associated with the elements discussed herein may be greater or less than described. Similarly, the control circuits described herein as being in the static switch module **17** could reside in the SMC **31**.

What is claimed is:

1. A power system **(8)** for providing uninterrupted electric power to a critical load **(14)**, comprising:

a. a first power source **(10)** providing sufficient power to supply the critical load **(14)**;

b. a second power source **(18)** comprising at least one fuel cell power plant **(18)**, the second power source providing sufficient power to supply the critical load **(14)** and adapted to be normally substantially continuously connected and providing power to, the critical load **(14)**;

c. a static switch **(19)** for selectively connecting and disconnecting the first power source **(10)** to the second power source **(18)** and (to) the critical load **(14)**; and

d. a switch controller **(49, 45**)for controlling the state of the static switch **(19)** to connect the first power source **(10)** with the critical load **(14)** and the second power source **(18)** during normal operation of the first power source **(10)** and to rapidly disconnect the first power source **(10)** from the critical load **(14)** and the second power source **(18)**if and when operation of the first power source **(10)** deviates beyond a limit from normal.

2. The power system **(8)** of claim **1** wherein the switch controller **(49, 45)** additionally controls the state of the static switch **(19)** to rapidly reconnect the first power source **(10)** with the critical load **(14)** and the second power source **(18)** when the first power source **(10)** returns to normal operation.

3. The power system **(8)** of claim **1** wherein the second power source **(18)** comprises only one or more fuel cell power plants **(18)**.

4. The power system **(8)** of claim **1** wherein the static switch **(19)** is a solid-state device.

5. The power system **(8)** of claim **4** wherein the solid-state device is a thyristor **(19)**.

6. The power system **(8)** of claim **1** wherein the first power source **(10)** is a utility power grid and wherein each fuel cell power plant **(18)** includes a power conditioning system (PCS) for configuring operation of the respective fuel cell **(18)** in a grid connected mode or in a grid independent mode in response to mode control signals **(D1/401', D2/402')**, and including a site management controller **(31)** connected intermediate the switch controller **(49, 45)** and the power conditioning system (PCS) and responsive to preliminary mode signals **(M1/401, M2/402)** from the switch controller **(49, 45)** for providing the mode control signals **(D1/401', D2/402')** to the fuel cell power conditioning system (PCS), whereby the fuel cell power plants **(18)** rapidly transition operation between the grid connected and the grid independent modes.

7. The power system of claim **6** wherein the rapid disconnection of the first power source **(10)** from the critical load **(14)** and the second power source **(18)**, and the rapid transitioning of operation of the at least one fuel cell **(18)** between the grid connected mode and the grid independent mode occurs within an interval of about 4 milliseconds.

8. The power system of claim **1** wherein the rapid disconnection of the first power source **(10)** from the critical load **(14)** and the second power source **(18)** occurs within an interval of about 4 milliseconds.

9. A power system **(8)** for providing substantially continuous electric power to at least a critical load **(14)**, comprising:

a. a utility grid power source **(10)** providing sufficient power to supply the critical load **(14)**;

b. at least one fuel cell power plant (18) operating substantially continuously for providing at least sufficient power to supply the critical load (14), the at least one fuel cell power plant (18) including a power conditioning system (PCS) for configuring operation of the respective fuel cell (18) in a grid connected mode or in a grid independent mode in response to mode control signals (D1/401', D2/402'), the at least one fuel cell power plant (18) being normally substantially continuously connected and providing power to, the critical load (14);

c. a static switch (19) for selectively connecting and disconnecting the grid power source (10) to the at least one fuel cell power plant (18) and to the critical load (14);

d. a switch controller (49, 45) for controlling the state of the static switch (19) to connect the grid power source (10) with the critical load (14) and the at least one fuel cell power plant (18) during normal operation of the grid power source (10) and to disconnect, within a 4 millisecond interval, the grid power source (10) from the critical load (14) and the at least one fuel cell power plant (18) when the grid power source deviates beyond a limit from normal; and

e. a site management controller (31) connected between the switch controller (49, 45) and the power conditioning system (PCS) and responsive to preliminary mode signals (M1/401, M2/402) from the switch controller (49, 45) for providing the mode control signals (D1/401', D2/402') to the fuel cell power conditioning system (PCS) to cause the at least one fuel cell power plant (18) to rapidly transition operation, within a 4 millisecond interval, between the grid connected mode and the grid independent mode.

10. A power system (8) for providing substantially continuous electric power to at least a critical load (14), comprising:

a. a utility grid power source (10) providing sufficient power to supply the critical load (14);

b. at least one fuel cell power plant (18) operating substantially continuously for providing at least sufficient power to supply the critical load (14), the at least one fuel cell power plant (18) including a power conditioning system (PCS) for configuring operation of the respective fuel cell (18) in a grid connected mode or in a grid independent mode in response to mode control signals (D1/401', D2/402'), the at least one fuel cell power plant (18) being normally substantially continuously connected and providing power to, the critical load (14);

c. a static switch (19) for selectively connecting and disconnecting the grid power source (10) to the at least one fuel cell power plant (18) and to the critical load (14);

d. a switch controller (49, 45) for controlling the state of the static switch (19) to connect the grid power source (10) with the critical load (14) and the at least one fuel cell power plant (18) during normal operation of the grid power source (10) and to disconnect, within less than an 8.3 millisecond interval, the grid power source (10) from the critical load (14) and the at least one fuel cell power plant (18) when the grid power source deviates beyond a limit from normal; and

e. a site management controller (31) connected with the switch controller (49, 45) and the power conditioning system (PCS) and responsive to the switch controller (49, 45) for providing mode control signals (D1/401', D2/402') to the fuel cell power conditioning system (PCS) to cause the at least one fuel cell power plant (18) to rapidly transition operation, within less than an 8.3 millisecond interval, between the grid connected mode and the grid independent mode.

11. The power system (8) of claim 10 wherein the at least one fuel cell power plant (18) is caused to rapidly transition operation between the grid connected mode and the grid independent mode in an interval of less than about 4 milliseconds.

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